



SYDIC Summer School 2026

Fourth edition of the Summer School of the Italian Society of System Dynamics

September, 14-18

Residenza Gasparini – Strada dell'Anselma 9, Piacenza (Italy)

The System Dynamic Summer School SYDIC has a five days intensive programme organised into integrated teaching blocks (fundamentals, modelling tools, applications and project work), guiding participants from problem conceptualisation to simulation and the assessment of policies/scenarios.

SUMMER SCHOOL OVERVIEW:

1) Course kick-off and overall framing:

presentation of objectives, structure and working methods (lectures, exercises, project groups)
alignment on expectations, prerequisites and expected outputs (group work + presentations)

2) Systems Thinking: key concepts for reading complex systems feedback, system boundaries, delays and implications for understanding problems

3) Qualitative modelling: Causal Loop Diagrams (CLDs) and archetypes building CLDs and using archetypes as recurring “patterns” hands-on cases/examples: translating causal hypotheses into conceptual models that can be interpreted and discussed

4) Fundamentals of System Dynamics: introduction to stocks, flows, feedback loops and delays
logic and purpose of simulation: from the diagram to understanding behaviour over time

5) From the causal model to the quantitative stock-and-flow model moving from CLDs to a stock-and-flow structure defining equations and parameters, structural choices and modelling assumptions

6) Linking structure and behaviour: dynamic patterns and reading results interpreting growth, goal-seeking and oscillations and their connection to feedback structure basic principles for comparing scenarios and discussing policy/intervention implications

7) Model rigour and quality: mathematical foundations and structural consistency linking System Dynamics to ODEs (ordinary differential equations) dimensional consistency, structural coherence and boundary definition criteria examples of explicit “carrying capacity” models and reading ecological predator–prey dynamics

8) Hands-on implementation of models/archetypes: practical sessions for implementing and experimenting with typical models (archetypes)
targeted exercises to consolidate operational skills in simulation and analysis

9) Deep dives and outlook: seminar on AI–System Dynamics integration presentation of approaches and case studies on hybrid AI–SD models, discussion of opportunities/limitations and application developments

10) Thematic applications: sustainability and real-world systems

1- Sustainability / Energy

using ST/SD to analyse transitions and sustainability dilemmas (scenarios, levers, trade-offs)

2- Agricultural systems

applications to agricultural systems: variables, boundaries, feedbacks and possible policies/strategies

3- Food systems

applications to food systems: interconnections, supply-chain dynamics, effects of interventions and scenarios

11) Project work (core track): from the problem to policy analysis group formation and selection of a real problem (including topics proposed by participants), progressive model development (causal map → stock-and-flow → simulations), intermediate presentations for feedback and re-alignment debriefing and conclusions

12) Networking and experiential learning moments: social activities such as a social dinner and the “Play with SD” session (games/simulations and networking activities) aimed at making systemic dynamics “visible” through participatory experiences and peer-to-peer exchange.

SUMMER SCHEDULE

Monday 14 September 2026

14:00–14:30 — Introduction to the Summer School programme

14:30–15:30 — Introduction to Systems Thinking

15:30–16:30 — Qualitative modelling

16:30–17:00 — Coffee break

17:30–18:30 — Practising Systems Thinking (CLD)

Tuesday 15 September 2026

09:00–10:00 — Introduction to System Dynamics

10:00–10:30 — Coffee break

10:30–11:30 — From CLDs to stock-and-flow models

11:30–12:30 — Linking feedback structures to simulated behaviour

12:30–14:00 — Lunch

14:00–15:00 — SD and ODEs (ordinary differential equations)

15:00–16:00 — Dimensional consistency, structural coherence, ...

16:00–16:30 — Coffee break

16:30–18:00 — SD models (species/resource explicit model, ...)

Wednesday 16 September 2026

09:00–10:30 — Practical sessions: model implementations (archetypes)

10:30–11:00 — Coffee break

11:00–12:30 — Seminar: hybrid AI–SD model

12:30–14:00 — Lunch

14:00–15:30 — ST and SD modelling application on Sustainability

15:30–16:00 — Coffee break

16:00–17:30 — Project work group formation + group work

17:30–18:00 — Project work presentations

Thursday 17 September 2026

09:00–10:30 — ST and SD modelling application in agricultural systems

10:30–11:00 — Coffee break
11:00–12:00 — Group work
12:00–12:30 — Project work presentations
12:30–14:00 — Lunch
14:00–15:30 — ST and SD modelling application in food systems
15:30–16:00 — Coffee break
16:00–17:30 — Group work
17:30–18:00 — Project work presentations
21:00–23:00 — “Play with SD” (evening networking/activity session)

Friday 18 September 2026

09:00–10:30 — Group work
10:30–11:00 — Coffee break
11:00–12:00 — Group work
12:00–13:00 — Debriefing and conclusions
13:00–14:30 — Lunch